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Load Forecast Uncertainty (LFU) Models for the 2022 IRM Study

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LFU Development Process

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LFU Model Development

Two key steps:

Determine Load Weather Relationship

- Identify weather variable (e.g. CTHI*) with predictive power to predict peak load
- Develop model to establish the load-weather relationship accounting effects for calendar events (e.g. Month, Day of Week)
- From the relationship, find predicted load at various weather values at most recent hottest conditions

Apply Uncertainty due to Peak Producing (PP) Weather Variation

- Create design condition and bin scenarios from historical peak producing weather conditions
- Evaluate load levels at various weather conditions from the load curve developed in previous step
- Find ratios of load levels at different weather conditions relative to the design condition and report with associated probabilities

CTHI – Cumulative Temperature Humidity Index

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LFU Model Development - Sensitivity

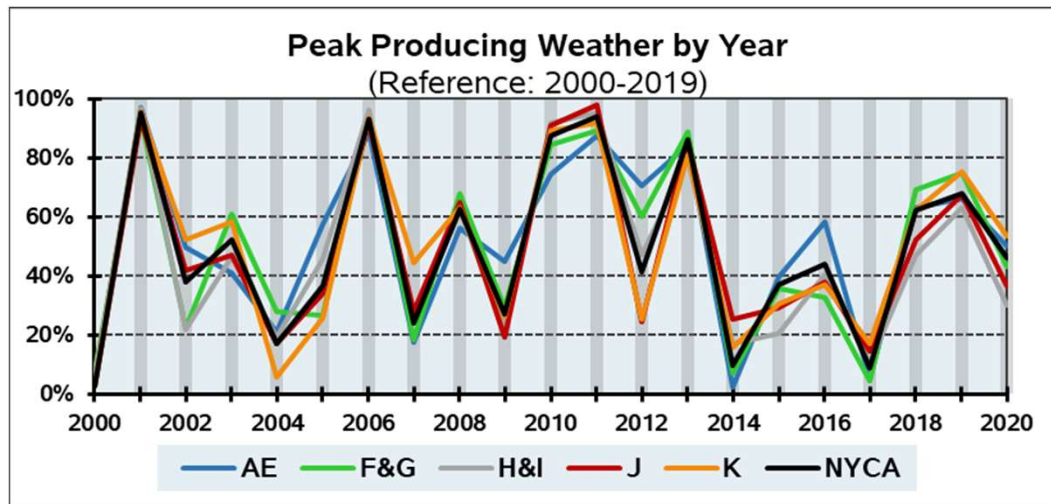**Both steps are important contributors to the model results:**
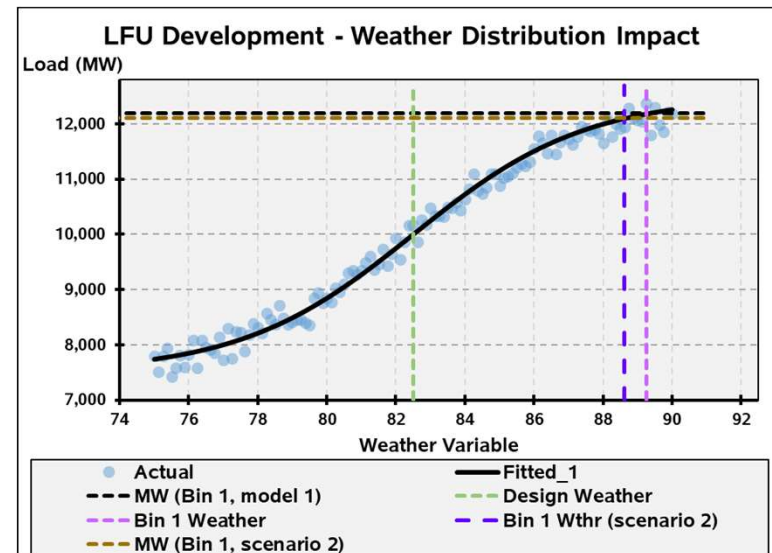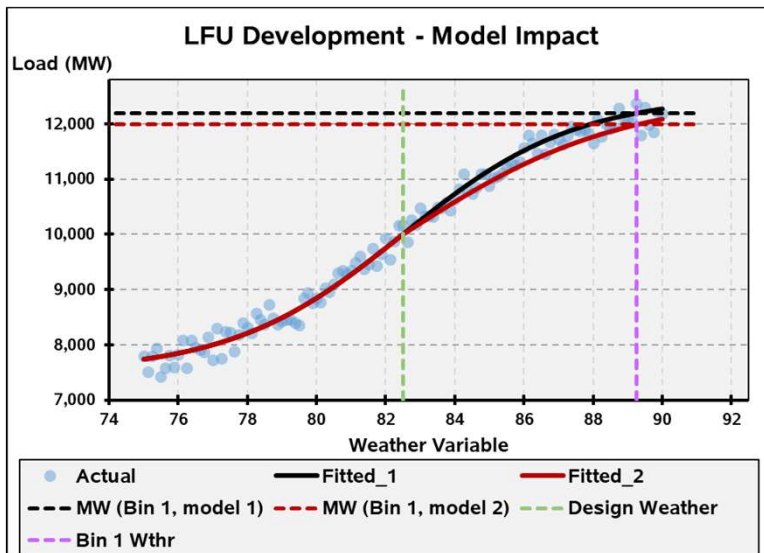
- Same weather distribution
- Same base load
- Updated load weather relationship

- Same load weather relationship
- Same base load
- Updated weather distribution

2020 Peak Producing Weather Summary

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Peak Producing (PP) Weather 2020

Area	PP Weather 2020	Percentile PP Weather 2020	Design Condition	Percentile PP Weather 2019
A-E	82.1	50%	50%	66%
F&G	84.1	43%	54%	75%
H&I	83.8	30%	64%	63%
J	84.8	37%	67%	68%
K	85.0	54%	50%	75%
NYCA	83.6	46%	57%	68%

Peak Producing Weather by Year
(Reference: 2000-2019)

Legend: AE, F&G, H&I, J, K, NYCA

- **Objective:** Review 2020 load-weather relationship for inclusion in the current LFU Models (2021 LFU Models)

- Overall, 2020 peak producing weather below the design condition (Note: Design Condition Reference Period is 2000-2019)

- Only Zone K peak producing weather higher than design weather in 2020

- Only H&I area below design condition in 2019

2021 LFU Models: https://www.nyiso.com/documents/20142/11883362/LFU_Summary.pdf

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2020 Weather Response Review

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Weather Response Zones A-E

Weather Response by Year

Weekdays only (Jun-Sep)
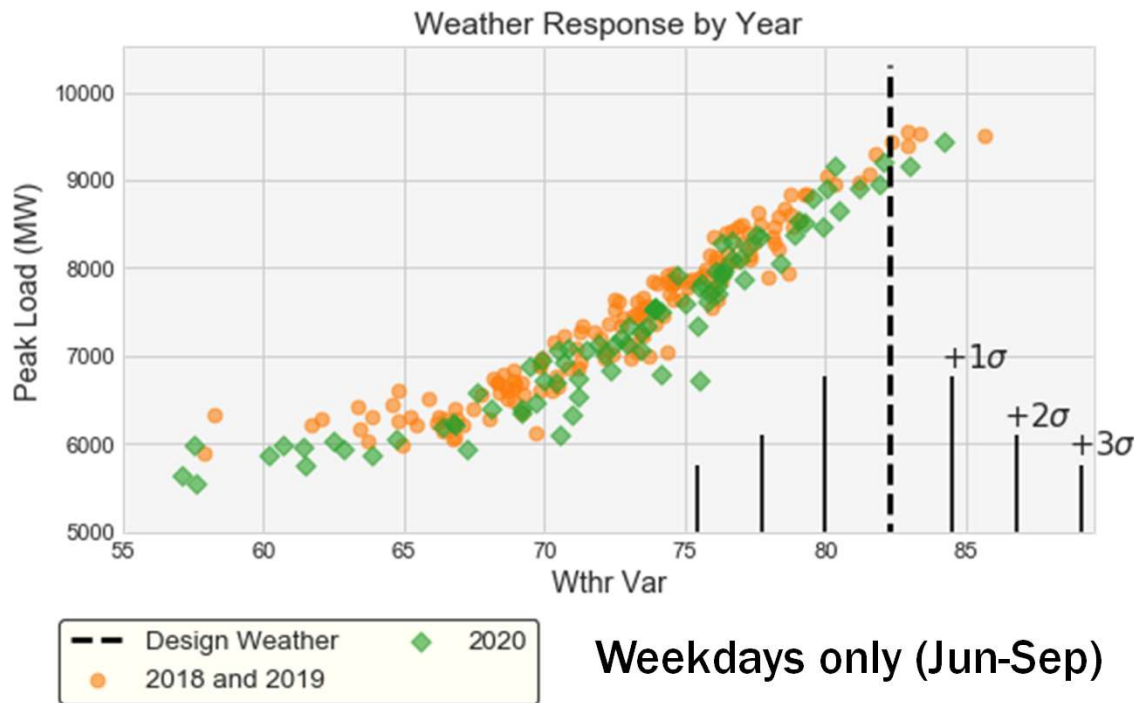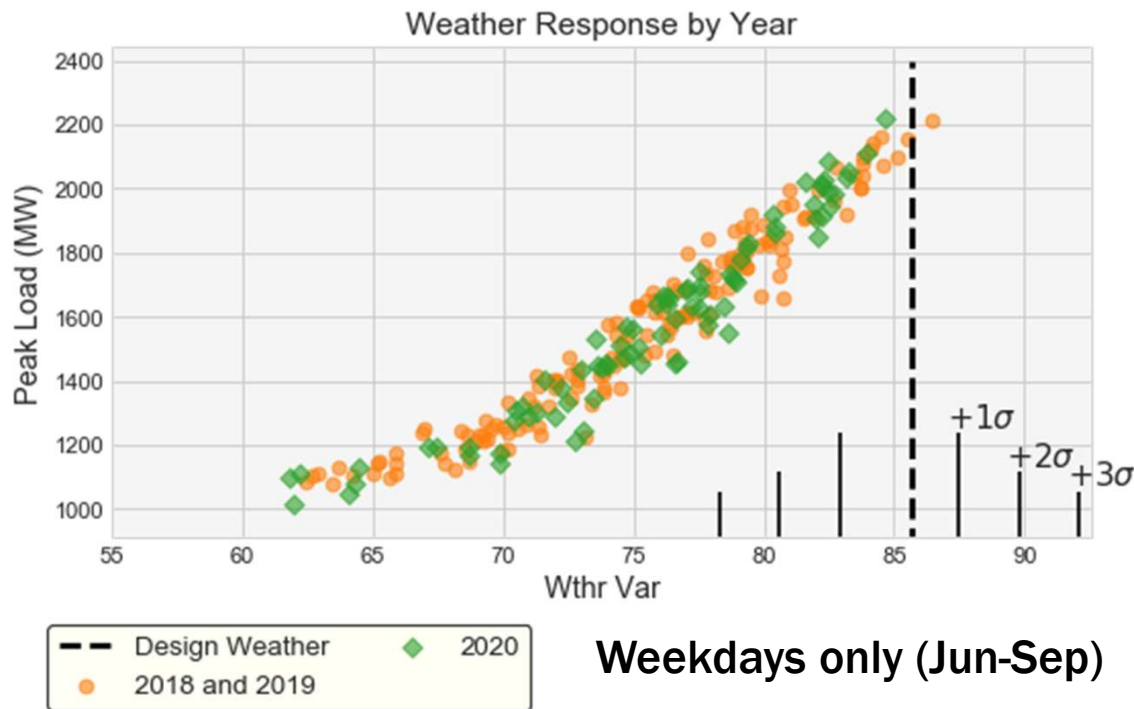
- Few 2020 samples at upper temperature

- 2020 level slightly below
  - More pronounced at CTHI = 60~75

Weather Response Zone F

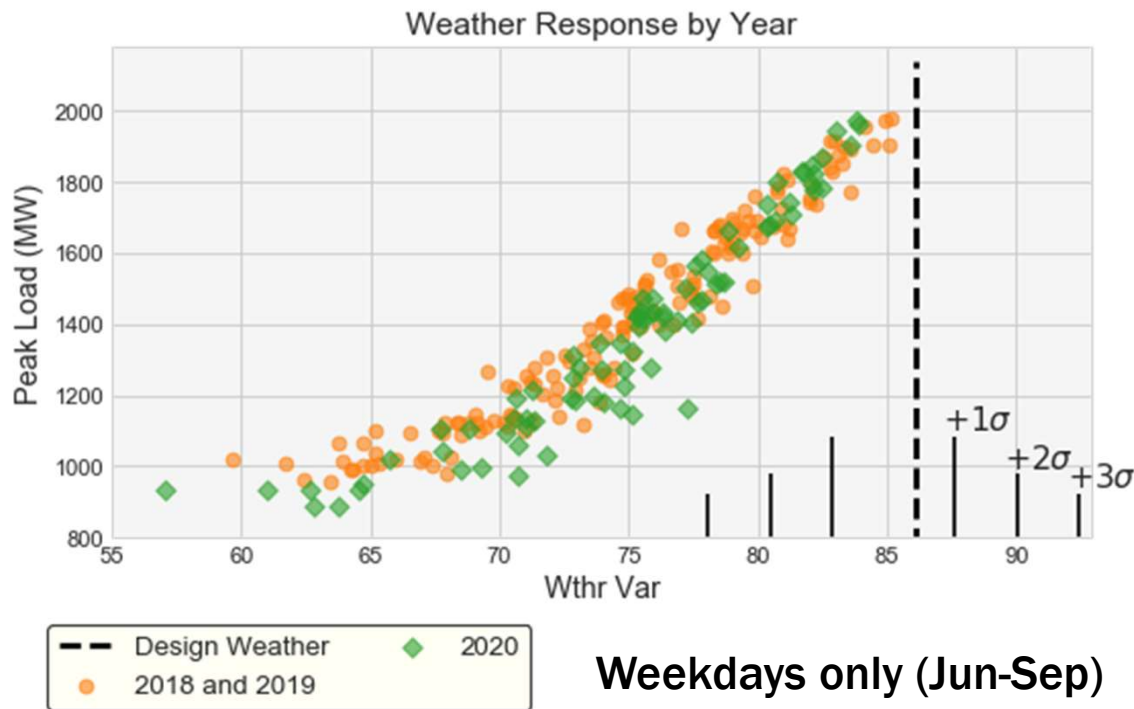Weather Response by Year
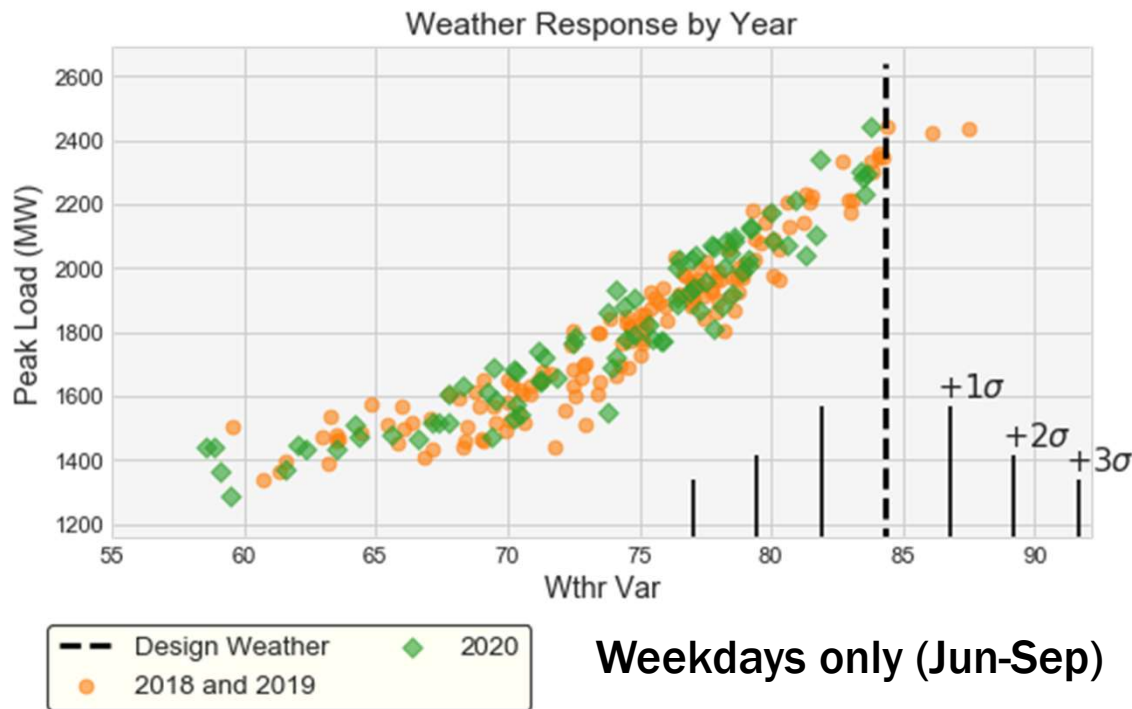
- No 2020 samples above design condition

- Slightly elevated level at CTHI = 70~75

Weekdays only (Jun-Sep)

Weather Response Zone G

Weather Response by Year

- No 2020 samples above design condition

- Lower 2020 level CTHI = 70~80, steeper curve at higher temperature

Weekdays only (Jun-Sep)

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Weather Response Zones H&I
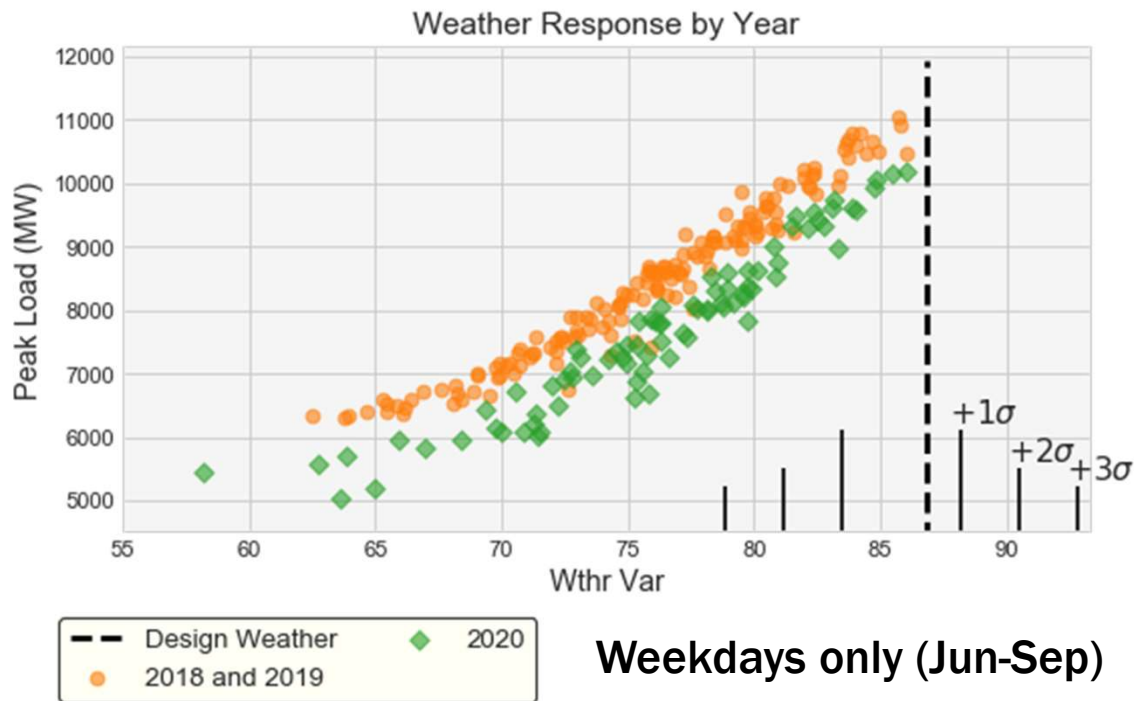

Weather Response by Year

Weekdays only (Jun-Sep)
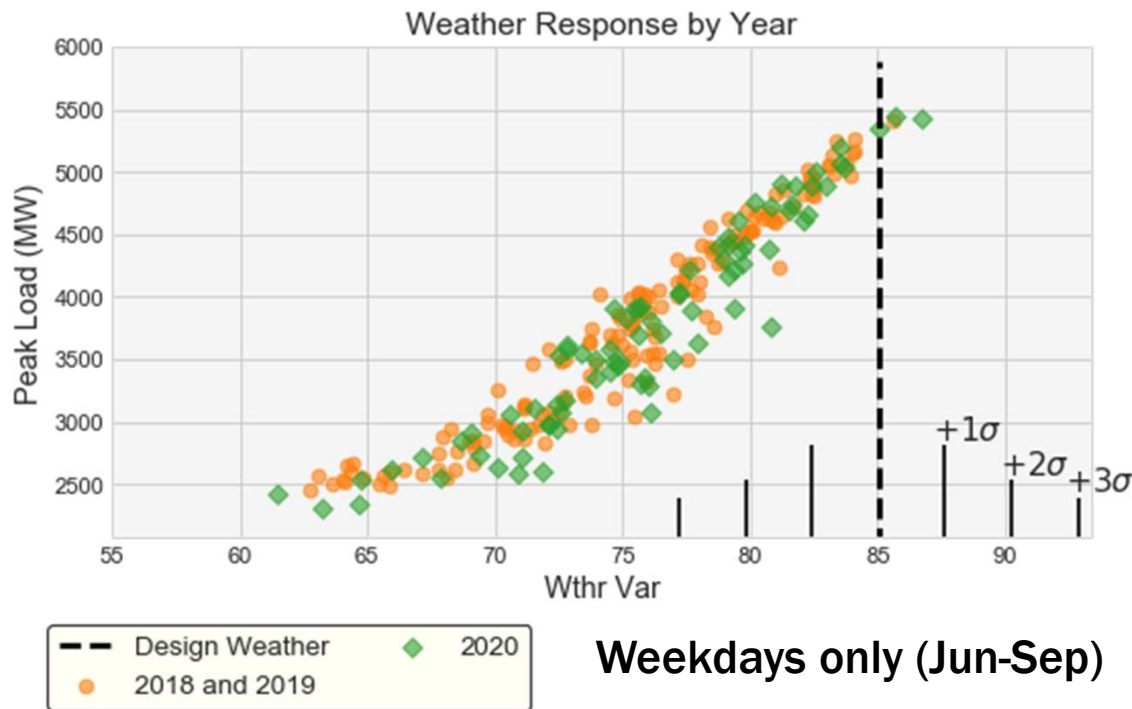
- No 2020 samples above design condition

- Lower 2020 level CTHI = 60~75, steeper curve at higher temperature

Weather Response Zone J

Weather Response by Year

Weekdays only (Jun-Sep)

- No 2020 sample above design condition

- Clear shift in load curve

- Visibly parallel load curves

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Weather Response Zone K

Weather Response by Year

- Few 2020 samples above design condition

- 2020 load profile similar to the prior years

Weekdays only (Jun-Sep)

Weather Response Summary

- **Few 2020 samples above design condition**
  - 2020 weather did not reach the 2018-2019 level except Zones J and K

- **Overall, 2020 weather response different from 2018-2019**
  - Visibly similar in Zone K

- **Parallel shift in Zone J**
  - Load levels were suppressed across all temperature conditions due to reduced economic activity during Summer 2020

- **Change in slope in A-E, G, H&I**
  - Steeper curve for CTHI > 75

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2021 LFU Models With 2020 Data Included

Approach

- **For each reliability area, two models were developed**
  - A single LFU Model with 2020 load and weather data
  - A pooled model: 2020 data combined with 2018 and 2019

- **For the pooled model:**
  - 2020 impact was modeled as a constant shift of the load pattern
  - Interaction between month and 2020 (i.e., different impacts in different months) was investigated and appropriate interactions were kept based on statistical significance

- **MW values were evaluated at the design and at different bin conditions so that they reflect the most recent hottest month(s) to calculate the LFU values**

- **Question: What impact will adding 2020 data to the current LFU models have?**

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LFU With 2020 Data – Zones A-E

Bin	LFU			Delta	
	2020 Model	**Pooled Model**	**Current**	**2020 - Current**	**Pooled - Current**
Design	100.0%	100.0%	100.0%	0.0%	0.0%
Bin_1	107.66%	108.51%	116.02%	-8.36%	-7.51%
Bin_2	106.34%	106.83%	111.11%	-4.76%	-4.27%
Bin_3	103.69%	103.90%	105.70%	-2.01%	-1.80%
Bin_4	100.00%	100.00%	100.00%	0.00%	0.00%
Bin_5	95.56%	95.43%	94.22%	1.34%	1.21%
Bin_6	90.67%	90.49%	88.58%	2.09%	1.90%
Bin_7	85.62%	85.45%	83.28%	2.34%	2.18%

- Similar results from 2020 model and pooled model
- LFU values significantly smaller than current values in upper bins
- Stronger saturation of the regression line, potentially caused by the steeper part just below design condition, ultimately trying to fit larger points with more curviness
- Suppressed load level in the upper bins contributing to the lower LFU values

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LFU With 2020 Data – Zones F&G

Bin	LFU			Delta	
	2020 Model	Pooled Model	Current	2020 - Current	Pooled - Current
Design	100.0%	100.0%	100.0%	0.0%	0.0%
Bin_1	115.08%	113.07%	117.17%	-2.09%	-4.10%
Bin_2	110.54%	109.34%	111.70%	-1.16%	-2.36%
Bin_3	105.25%	104.73%	105.70%	-0.45%	-0.97%
Bin_4	99.40%	99.46%	99.36%	0.04%	0.09%
Bin_5	93.22%	93.75%	92.89%	0.33%	0.86%
Bin_6	86.90%	87.83%	86.48%	0.42%	1.36%
Bin_7	80.66%	81.93%	80.33%	0.33%	1.60%

- 2020 model produced slightly higher LFU values than the pooled model in upper bins
  - Pooled model exhibiting more saturation from prior years' data points
- LFU values smaller than current values in upper bins
- Contributing factors:
  - Elevated load levels around design condition
  - Stronger saturation in the upper temperature region

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LFU With 2020 Data – Zones H&I

Bin	LFU			Delta	
	2020 Model	Pooled Model	Current	2020 - Current	Pooled - Current
Design	100.0%	100.0%	100.0%	0.0%	0.0%
Bin_1	120.20%	111.95%	113.56%	6.64%	-1.60%
Bin_2	112.57%	108.46%	109.46%	3.12%	-1.00%
Bin_3	104.95%	103.67%	104.06%	0.90%	-0.39%
Bin_4	97.33%	97.88%	97.68%	-0.35%	0.20%
Bin_5	89.71%	91.40%	90.66%	-0.95%	0.74%
Bin_6	82.09%	84.53%	83.35%	-1.25%	1.18%
Bin_7	74.47%	77.56%	76.06%	-1.59%	1.51%

- Large deviation between 2020 and pooled model; produced much higher and lower than current LFU values in the upper bins
- 2020 data alone did not yield a statistically reliable 3rd order model, so a linear model was used; extrapolation of linear model with no saturation produced large LFU values in the upper bins
- Both models produced elevated load levels around design condition
- Stronger saturation in the pooled model
  - Elevated base load (driven by 2020 points)
  - Lack of 2020 samples in the upper temperatures

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LFU With 2020 Data – Zone J

Bin	LFU			Delta	
	2020 Model	Pooled Model	Current	2020 - Current	Pooled - Current
Design	100.0%	100.0%	100.0%	0.0%	0.0%
Bin_1	111.69%	110.79%	110.73%	0.96%	0.06%
Bin_2	107.65%	107.23%	107.33%	0.32%	-0.10%
Bin_3	102.92%	102.82%	102.89%	0.03%	-0.08%
Bin_4	97.69%	97.75%	97.67%	0.03%	0.08%
Bin_5	92.12%	92.22%	91.91%	0.21%	0.31%
Bin_6	86.36%	86.43%	85.86%	0.50%	0.56%
Bin_7	80.60%	80.57%	79.79%	0.81%	0.78%

- Similar results from both models
- Suppressed 2020 load levels; both models produced almost parallel downward shift of the regression line
- Marginally higher LFU values in the top bin
  - Potentially caused by smaller numerator and denominator values

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LFU With 2020 Data – Zone K

Bin	LFU			Delta	
	2020 Model	**Pooled Model**	**Current**	**2020 - Current**	**Pooled - Current**
Design	100.0%	100.0%	100.0%	0.0%	0.0%
Bin_1	111.62%	111.42%	116.38%	-4.76%	-4.96%
Bin_2	110.06%	109.72%	111.97%	-1.91%	-2.25%
Bin_3	106.00%	105.75%	105.98%	0.02%	-0.24%
Bin_4	100.00%	100.00%	100.00%	0.00%	0.00%
Bin_5	92.60%	92.97%	91.88%	0.73%	1.09%
Bin_6	84.36%	85.14%	82.34%	2.02%	2.81%
Bin_7	75.83%	77.01%	75.52%	0.31%	1.50%

- Both models suggest slightly elevated load levels around design conditions
- Stronger saturation from both models in the upper bins
- LFU values– significantly smaller than current values in the upper bins
  - Potentially caused by smaller numerator (stronger saturation) and
  - Bigger denominator (higher base load)

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Summary – LFU Models With 2020 Data

- **A-E**
  - Significantly smaller LFU values
  - Few 2020 data points above design condition; 2020 elevated load levels around design condition made the regression line flatter and hence there was stronger saturation
- **F&G**
  - 2020 and pooled model do not agree
  - Stronger saturation in the upper bin region, primarily derived from prior years' points (uncertainty whether the load level would follow similar load weather relationship)
- **H&I**
  - Stronger saturation in the upper bin region, primarily derived from prior years' points (uncertainty whether the load level would follow similar load weather relationship)

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Summary – LFU With 2020 Data (Contd.)

- J
  - Suppressed load levels
  - Very similar LFU values in the upper bins
- K
  - Similar overall load shape
  - Small changes in base load and load levels in the upper bins
  - Big change in LFU values in the upper bins

Recommendation for IRM 2022:

Different weather sensitivity, lack of data points above design conditions, and dynamic nature of COVID impact preclude us from recommending using 2020 data in the LFU models

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2022 LFU Models Recommendation: Updated Bin Structure

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Proposed Bin Structure

Bin Structure – Current and Proposed (Z-Scores)

z score associated to the bins:

Current - Solid
Proposed - Dashed

z divides area equally, putting equal probability on either side

z equidistant from lower and upper bound

Bin 1   Bin 2   Bin 3   Bin 4   Bin 5   Bin 6   Bin 7
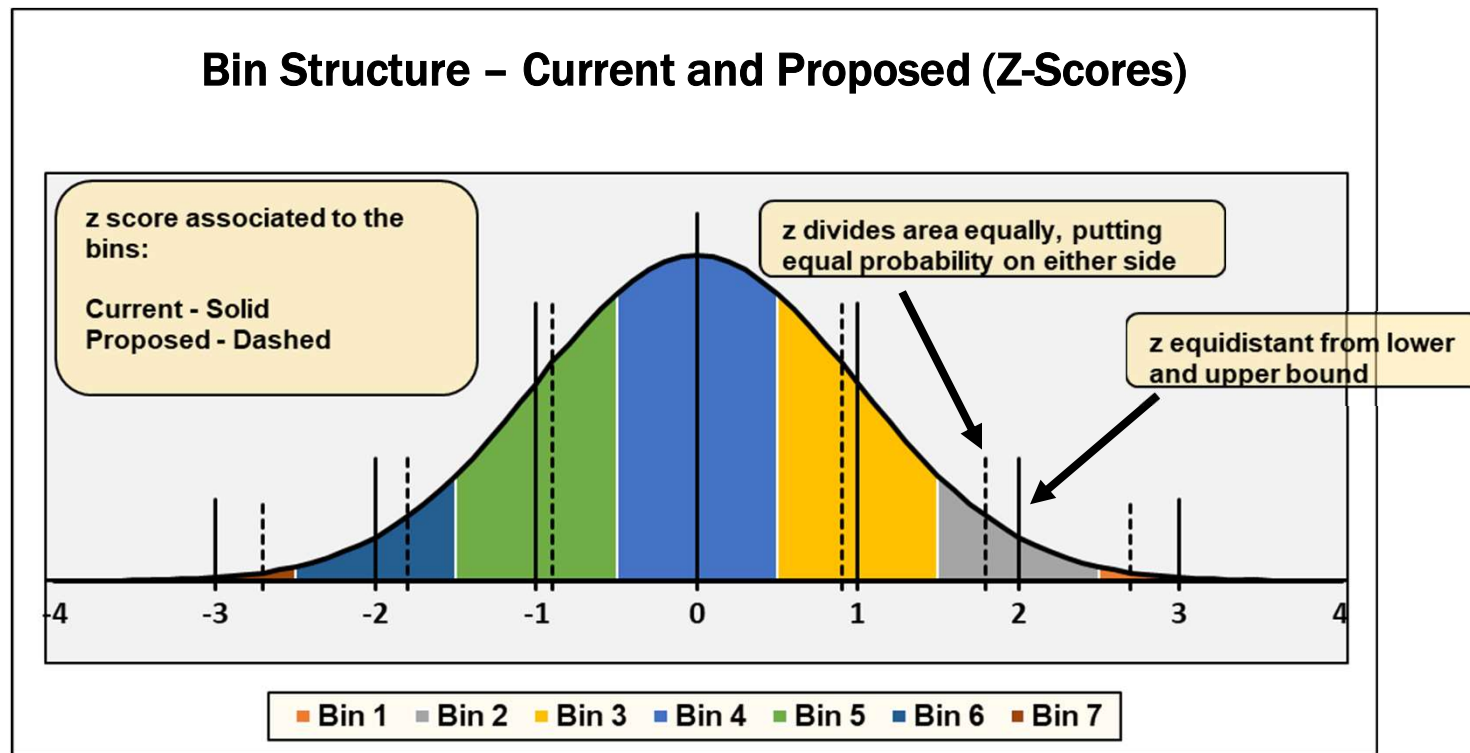
Proposed Bin Structure (Contd.)

				Current Bin Structure				
Bin	Bin Lower Bound	Bin Upper Bound	Bin Probability	Associated z Score	Probabiltiy Left	Probabiltiy Right	Left Percentage	Right Percentage
1	2.5	+ Inf	0.0062	3.00	0.0049	0.0013	78%	22%
2	1.5	2.5	0.0606	2.00	0.0441	0.0165	73%	27%
3	0.5	1.5	0.2417	1.00	0.1499	0.0918	62%	38%
4	-0.5	0.5	0.3829	0.00	0.1915	0.1915	50%	50%
5	-1.5	-0.5	0.2417	-1.00	0.0918	0.1499	38%	62%
6	-2.5	-1.5	0.0606	-2.00	0.0165	0.0441	27%	73%
7	- Inf	-2.5	0.0062	-3.00	0.0013	0.0049	22%	78%

				Proposed Bin Structure				
Bin	Bin Lower Bound	Bin Upper Bound	Bin Probability	Associated z Score	Probabiltiy Left	Probabiltiy Right	Left Percentage	Right Percentage
1	2.5	+ Inf	0.0062	2.74	0.0031	0.0031	50%	50%
2	1.5	2.5	0.0606	1.79	0.0303	0.0303	50%	50%
3	0.5	1.5	0.2417	0.89	0.1209	0.1209	50%	50%
4	-0.5	0.5	0.3829	0.00	0.1915	0.1915	50%	50%
5	-1.5	-0.5	0.2417	-0.89	0.1209	0.1209	50%	50%
6	-2.5	-1.5	0.0606	-1.79	0.0303	0.0303	50%	50%
7	- Inf	-2.5	0.0062	-2.74	0.0031	0.0031	50%	50%

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Proposed Bin Structure (Contd.)

Proposed (based on equal area z-scores)

Bin	Bin Probability	A-E	F&G	H&I	J	K	NYCA (Winter)
1	0.0062	114.78%	115.85%	112.55%	109.95%	115.63%	111.01%
2	0.0606	110.01%	110.53%	108.40%	106.49%	110.73%	106.89%
3	0.2417	105.06%	105.01%	103.36%	102.33%	105.30%	103.25%
4	0.3830	100.00%	99.36%	97.68%	97.67%	100.00%	100.00%
5	0.2417	94.88%	93.61%	91.50%	92.58%	92.96%	97.05%
6	0.0606	89.73%	87.77%	84.89%	87.13%	84.32%	94.34%
7	0.0062	84.63%	81.88%	77.98%	81.38%	76.60%	91.85%

Current (based on equidistant z-scores)

Bin	Bin Probability	A-E	F&G	H&I	J	K	NYCA (Winter)
1	0.0062	116.02%	117.17%	113.56%	110.73%	116.38%	112.22%
2	0.0606	111.11%	111.70%	109.46%	107.33%	111.97%	107.77%
3	0.2417	105.70%	105.70%	104.06%	102.89%	105.98%	103.69%
4	0.3830	100.00%	99.36%	97.68%	97.67%	100.00%	100.00%
5	0.2417	94.22%	92.89%	90.66%	91.91%	91.88%	96.69%
6	0.0606	88.58%	86.48%	83.35%	85.86%	82.34%	93.76%
7	0.0062	83.28%	80.33%	76.06%	79.79%	75.52%	91.22%

Delta (Proposed - Current)

Bin	A-E	F&G	H&I	J	K	NYCA (Winter)
1	-1.24%	-1.32%	-1.01%	-0.78%	-0.75%	-1.21%
2	-1.10%	-1.17%	-1.06%	-0.84%	-1.24%	-0.88%
3	-0.64%	-0.69%	-0.70%	-0.56%	-0.68%	-0.44%
4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	0.66%	0.72%	0.84%	0.67%	1.08%	0.36%
6	1.15%	1.29%	1.54%	1.27%	1.98%	0.58%
7	1.35%	1.55%	1.92%	1.59%	1.08%	0.63%

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LFU Model 2022 Recommendations

- Use the current (2021) models that describe load weather relationship
- Use equal area based z-scores for the defined bins
- Revisit this analysis in 2022 with an eye towards examining the load-weather relationship in 2021

Final Recommendations							
Bin	Bin Probability	A-E	F&G	H&I	J	K	NYCA (Winter)
1	0.0062	114.78%	115.85%	112.55%	109.95%	115.63%	111.01%
2	0.0606	110.01%	110.53%	108.40%	106.49%	110.73%	106.89%
3	0.2417	105.06%	105.01%	103.36%	102.33%	105.30%	103.25%
4	0.3830	100.00%	99.36%	97.68%	97.67%	100.00%	100.00%
5	0.2417	94.88%	93.61%	91.50%	92.58%	92.96%	97.05%
6	0.0606	89.73%	87.77%	84.89%	87.13%	84.32%	94.34%
7	0.0062	84.63%	81.88%	77.98%	81.38%	76.60%	91.85%

Questions?

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Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability

- Operating open, fair and competitive wholesale electricity markets

- Planning the power system for the future

- Providing factual information to policymakers, stakeholders and investors in the power system

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Modeling Reference Slides

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2020 Model – Zones A-E

	Coef.	Std.Err.	t	P>|t|
Intercept	161690.34	26496.24	6.10	0.0000
wthr	-6435.98	1113.44	-5.78	0.0000
wthr2	86.83	15.53	5.59	0.0000
wthr3	-0.38	0.07	-5.26	0.0000
May	-806.94	57.66	-14.00	0.0000
Jun	-224.76	43.29	-5.19	0.0000
Sep	-279.11	49.93	-5.59	0.0000
Sat	-464.81	48.68	-9.55	0.0000
Sun	-429.90	46.10	-9.33	0.0000

Weather Response

Fitted vs Actual
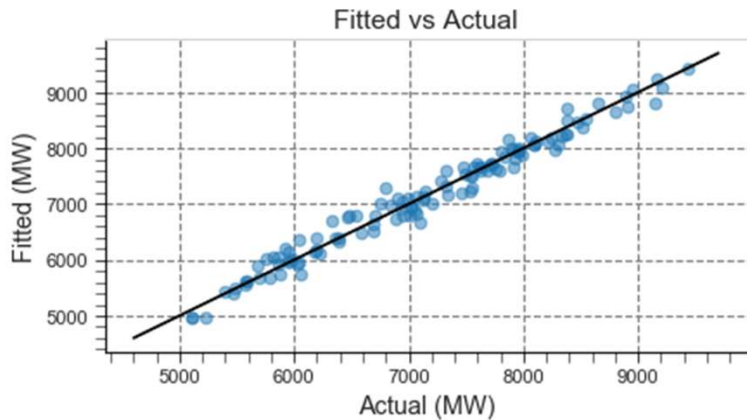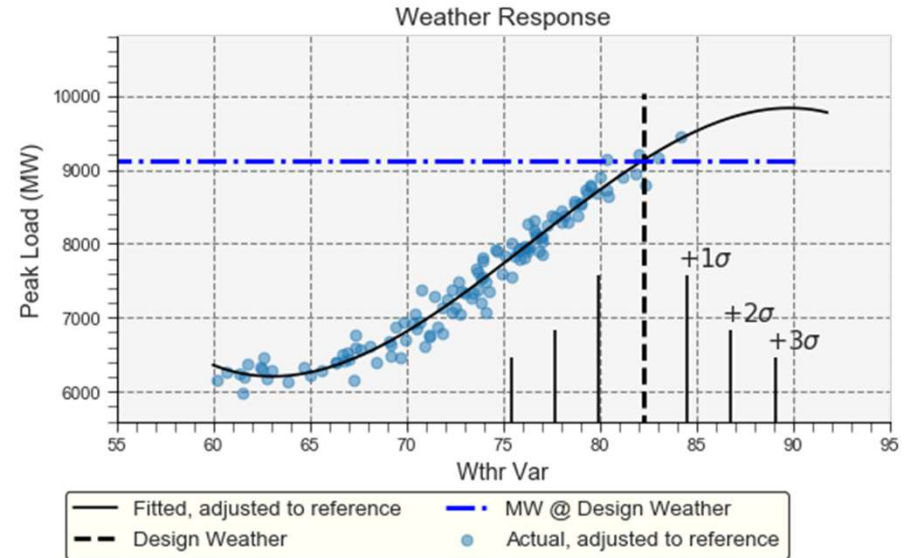
N	120
DF Model	8
R-Sq (%)	97.4
Adj. R-Sq (%)	97.2

Pooled Model – Zones A-E

	Coef.	Std.Err.	t	P>|t|
Intercept	167582.76	16926.12	9.90	0.0000
wthr	-6613.89	704.55	-9.39	0.0000
wthr2	88.48	9.74	9.08	0.0000
wthr3	-0.38	0.04	-8.55	0.0000
Y2018	152.82	17.74	8.62	0.0000
May	-556.44	35.48	-15.68	0.0000
Jun	-268.52	22.04	-12.19	0.0000
Sep	-169.63	26.98	-6.29	0.0000
May_2020	-304.51	51.77	-5.88	0.0000
Sep_2020	-147.43	40.91	-3.60	0.0004
Sat	-584.49	23.77	-24.59	0.0000
Sun	-532.67	22.72	-23.45	0.0000
Fri	-126.28	23.55	-5.36	0.0000
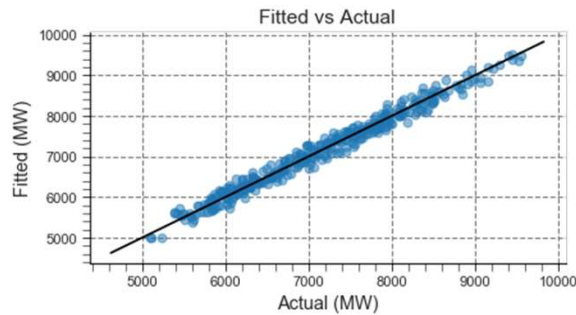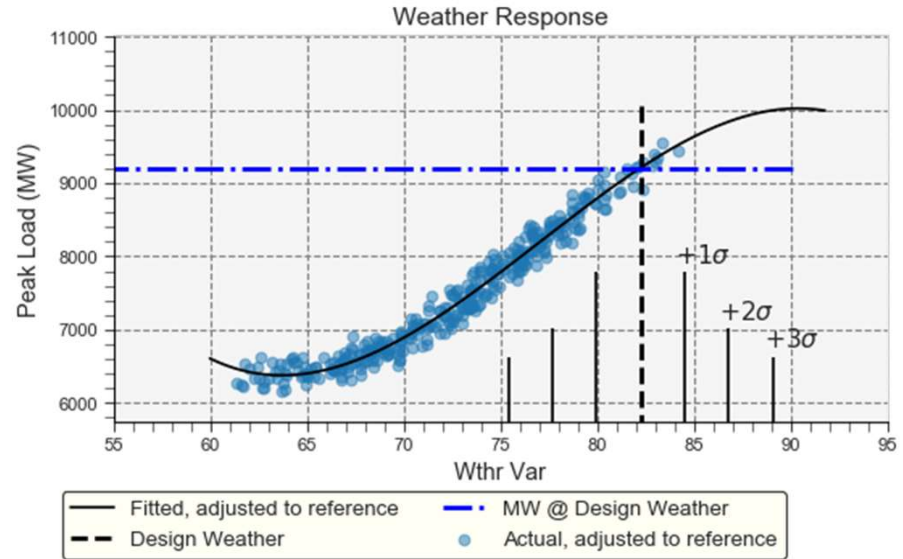
N	350
DF Model	12
R-Sq (%)	97.9
Adj. R-Sq (%)	97.8

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Weather Response – Zones A-E
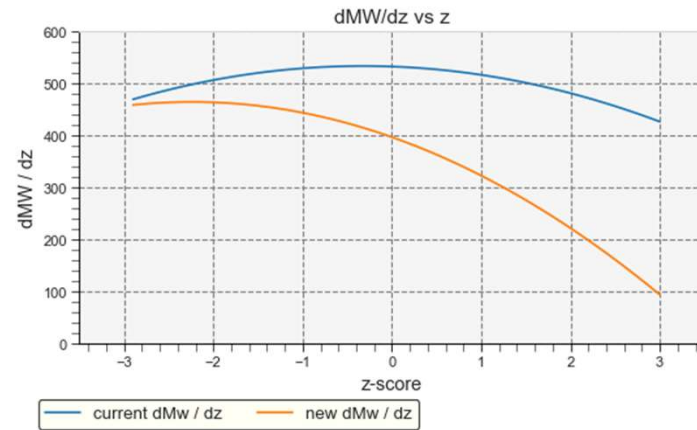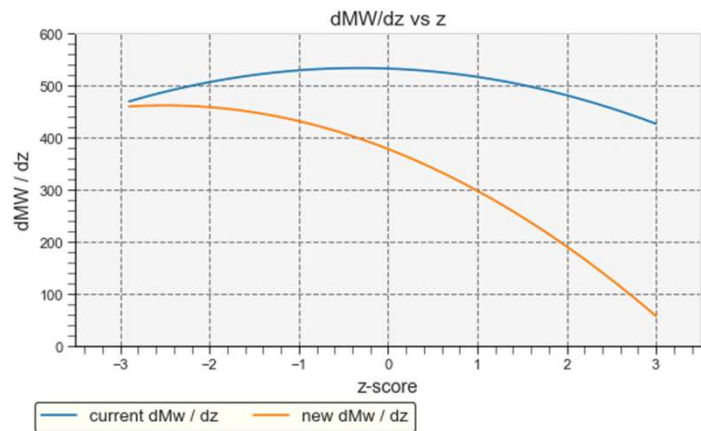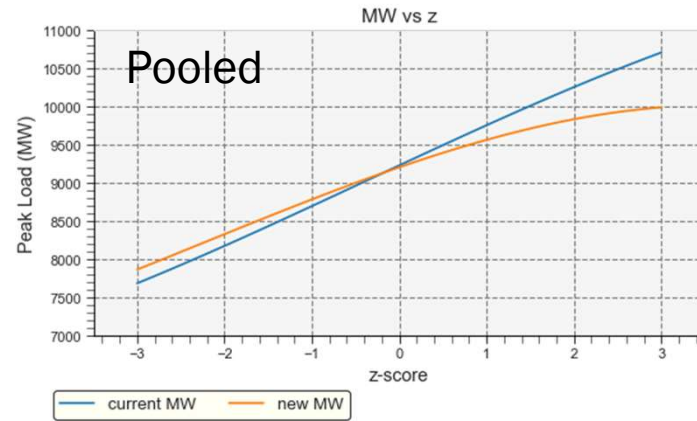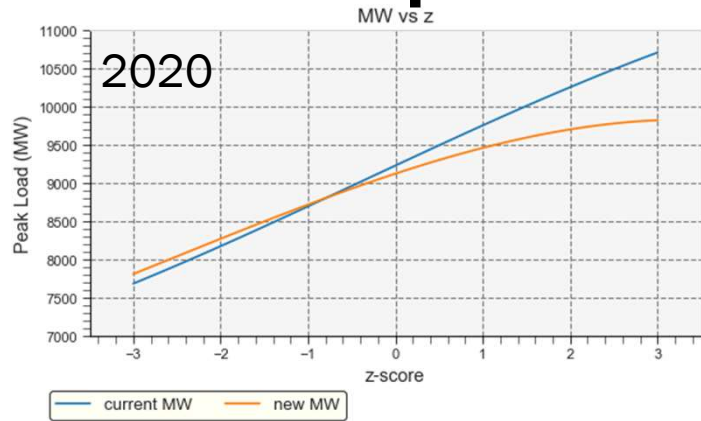
LFU Model Results – Zones A-E

Bin	LFU		
	2020 Model	**Pooled Model**	**Current**
Design	100.0%	100.0%	100.0%
Bin_1	107.66%	108.51%	116.02%
Bin_2	106.34%	106.83%	111.11%
Bin_3	103.69%	103.90%	105.70%
Bin_4	100.00%	100.00%	100.00%
Bin_5	95.56%	95.43%	94.22%
Bin_6	90.67%	90.49%	88.58%
Bin_7	85.62%	85.45%	83.28%

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2020 Model – Zones F&G

	Coef.	Std.Err.	t	P>|t|
Intercept	61922.03	35499.10	1.74	0.0839
wthr	-2394.31	1431.43	-1.67	0.0973
wthr2	31.14	19.20	1.62	0.1078
wthr3	-0.13	0.09	-1.50	0.1373
May	-390.09	34.93	-11.17	0.0000
Jun	-130.02	25.80	-5.04	0.0000
Sat	-127.82	31.50	-4.06	0.0001
Sun	-146.51	31.13	-4.71	0.0000

Weather Response

Fitted vs Actual
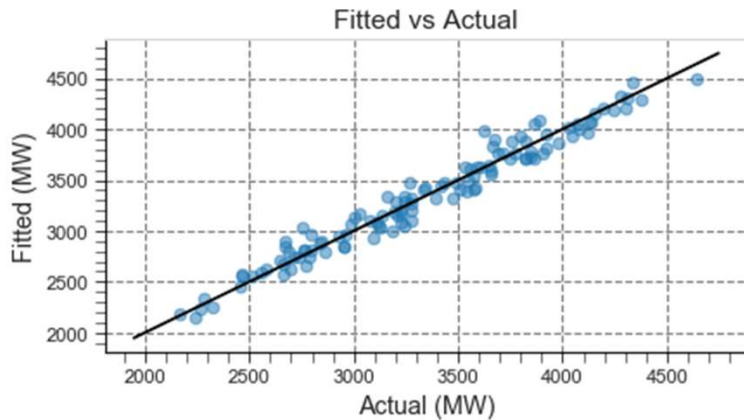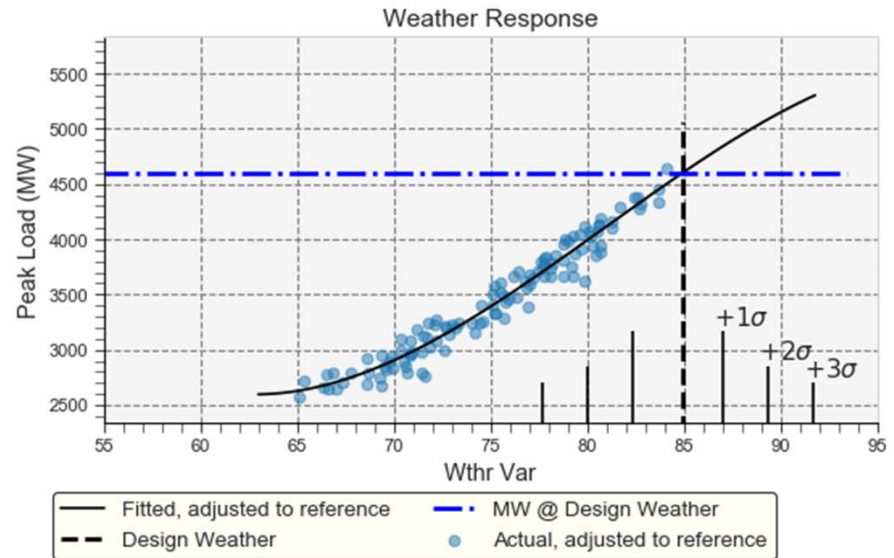
N	116
DF Model	7
R-Sq (%)	96.4
Adj. R-Sq (%)	96.1

New York ISO

Pooled Model – Zones F&G

	Coef.	Std.Err.	t	P>|t|
Intercept	64879.03	7424.14	8.74	0.0000
wthr	-2510.06	306.47	-8.19	0.0000
wthr2	32.75	4.20	7.80	0.0000
wthr3	-0.14	0.02	-7.14	0.0000
Y2019	-81.10	11.04	-7.35	0.0000
May	-249.64	20.77	-12.02	0.0000
Jun	-101.26	16.59	-6.10	0.0000
Sep	-65.88	16.43	-4.01	0.0001
May_2020	-161.26	27.98	-5.76	0.0000
Jun_2020	-48.64	23.57	-2.06	0.0398
Sat	-216.96	14.64	-14.82	0.0000
Sun	-167.32	14.76	-11.34	0.0000
Fri	-69.29	14.47	-4.79	0.0000

Weather Response

Fitted vs Actual
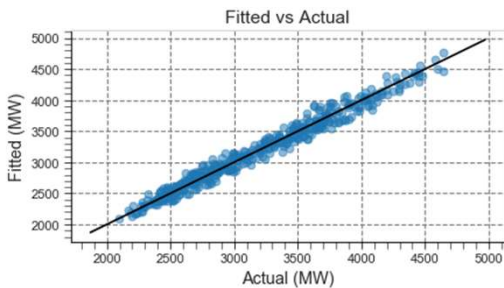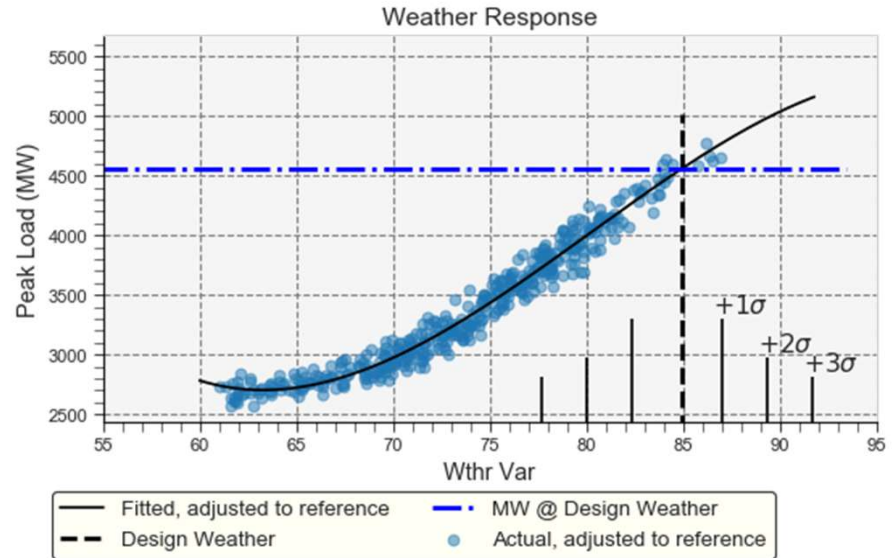
N	397
DF Model	12
R-Sq (%)	97.4
Adj. R-Sq (%)	97.3

New York ISO

Weather Response – Zones F&G
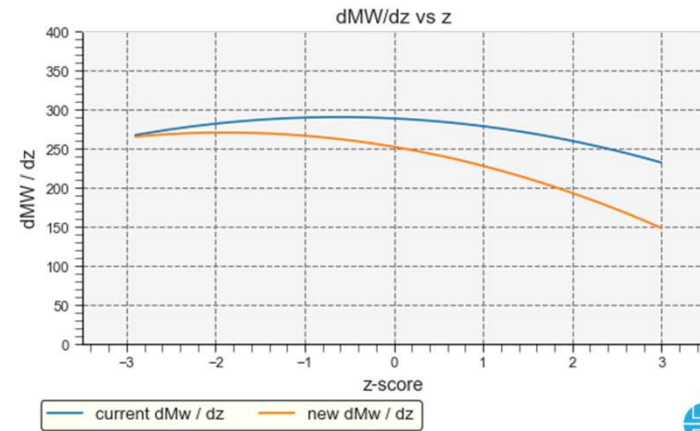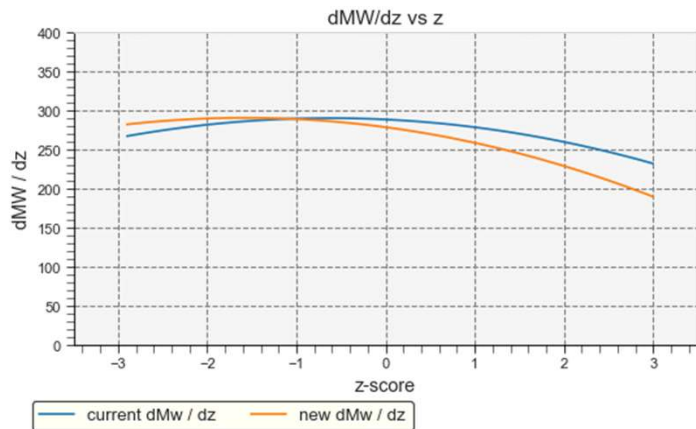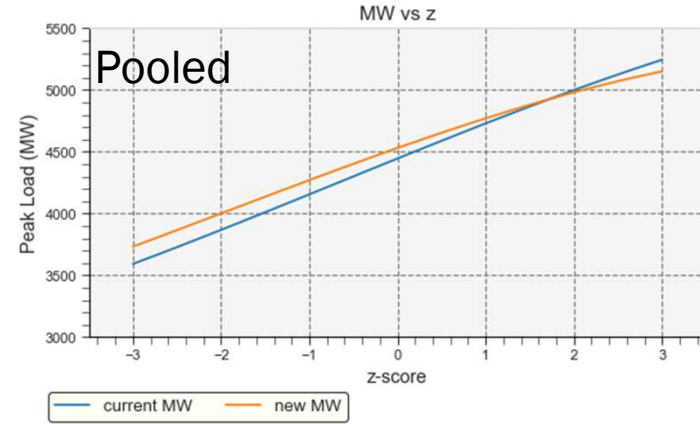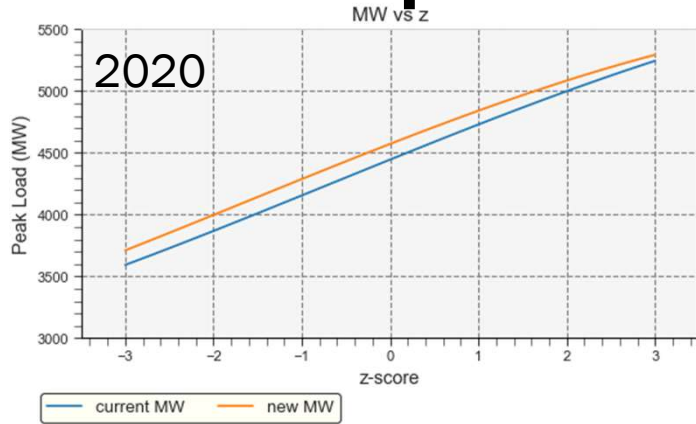
LFU Model Results – Zones F&G

Bin	LFU		
	2020 Model	Pooled Model	Current
Design	100.0%	100.0%	100.0%
Bin_1	115.08%	113.07%	117.17%
Bin_2	110.54%	109.34%	111.70%
Bin_3	105.25%	104.73%	105.70%
Bin_4	99.40%	99.46%	99.36%
Bin_5	93.22%	93.75%	92.89%
Bin_6	86.90%	87.83%	86.48%
Bin_7	80.66%	81.93%	80.33%

New York ISO

2020 Model – Zones H&I

	Coef.	Std.Err.	t	P>|t|
Intercept	17236.67	8274.11	2.08	0.0394
wthr	-617.97	343.45	-1.80	0.0745
wthr2	7.24	4.73	1.53	0.1288
wthr3	-0.02	0.02	-1.12	0.2633
May	-78.08	15.58	-5.01	0.0000
Sat	-81.73	13.23	-6.18	0.0000
Sun	-87.62	13.23	-6.62	0.0000

Unstable 3rd order model

	Coef.	Std.Err.	t
Intercept	-3622.98	148.56	-24.39
wthr	66.21	1.91	34.71
May	-96.86	40.20	-2.41
WkEnd	-109.78	13.45	-8.16

Fitted vs Actual

Weather Response
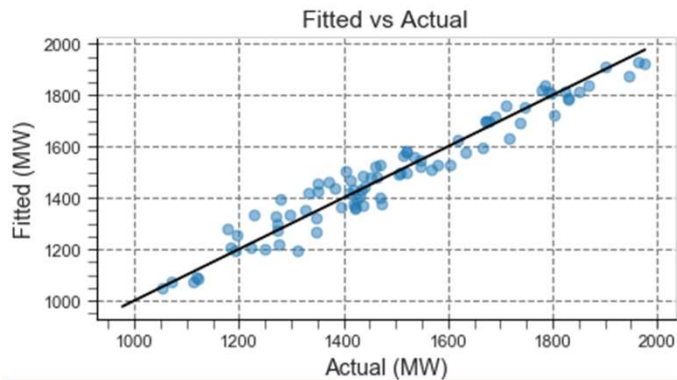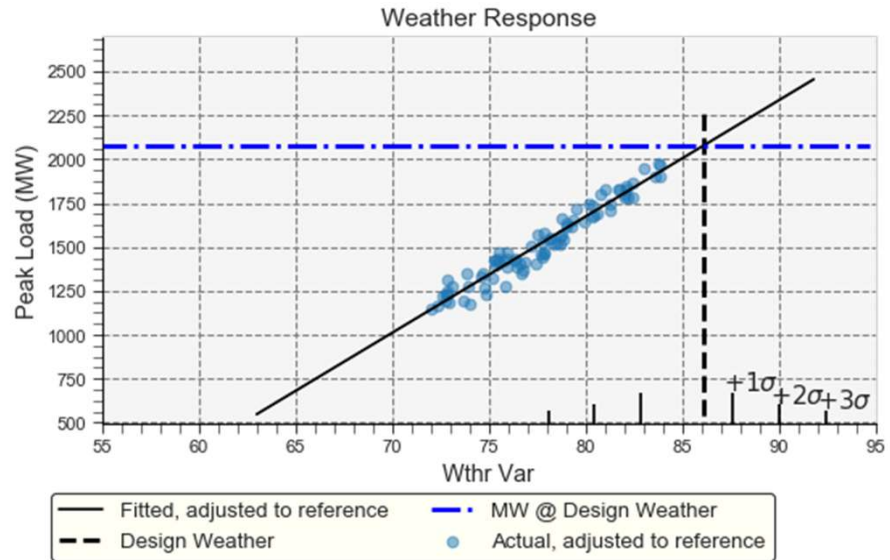
N	84
DF Model	3
R-Sq (%)	94.5
Adj. R-Sq (%)	94.3

New York ISO

Pooled Model – Zones H&I

	Coef.	Std.Err.	t	P>|t|
Intercept	34870.44	4200.42	8.30	0.0000
wthr	-1367.21	172.97	-7.90	0.0000
wthr2	17.89	2.36	7.57	0.0000
wthr3	-0.07	0.01	-6.97	0.0000
Y2018	66.89	6.93	9.65	0.0000
Y2019	37.32	6.95	5.37	0.0000
hotJul_2020	-49.94	11.84	-4.22	0.0000
May	-69.31	8.80	-7.87	0.0000
Sep	-22.23	7.51	-2.96	0.0033
WkEnd	-104.26	5.98	-17.44	0.0000
Fri	-22.66	7.91	-2.86	0.0044

Weather Response

Fitted vs Actual
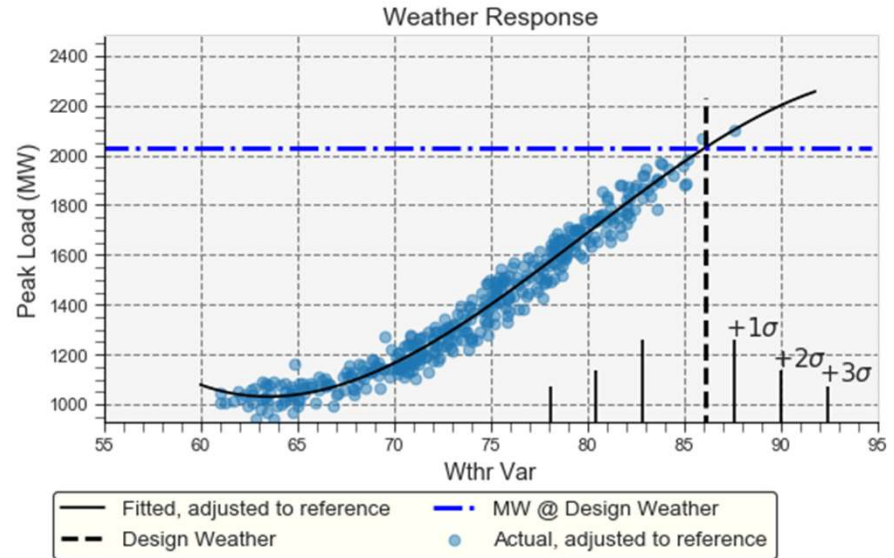
N	387
DF Model	10
R-Sq (%)	97
Adj. R-Sq (%)	97

New York ISO
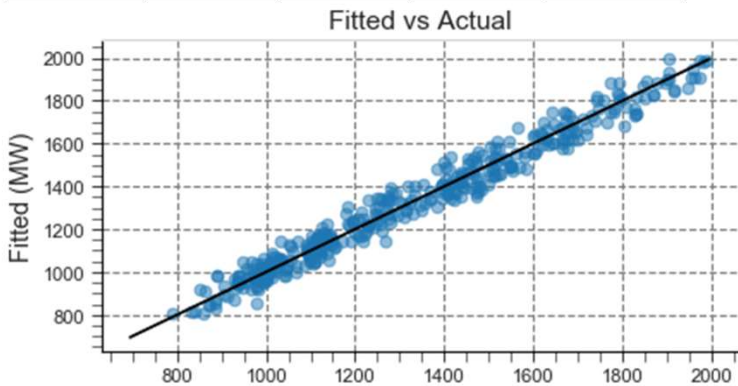
Weather Response – Zones H&I
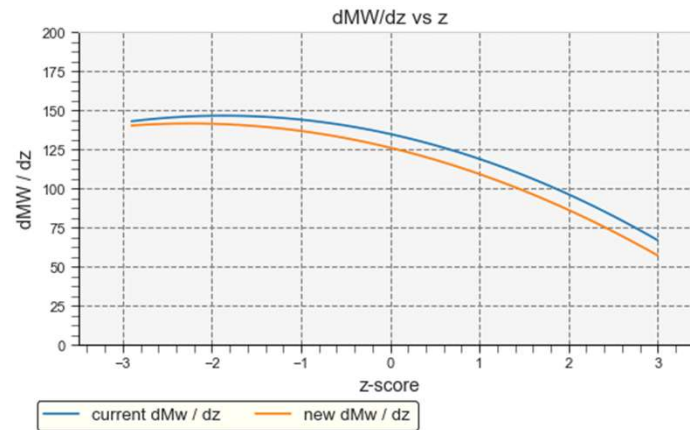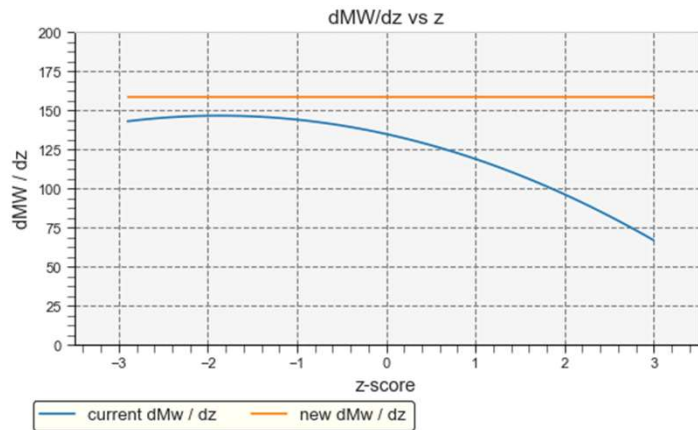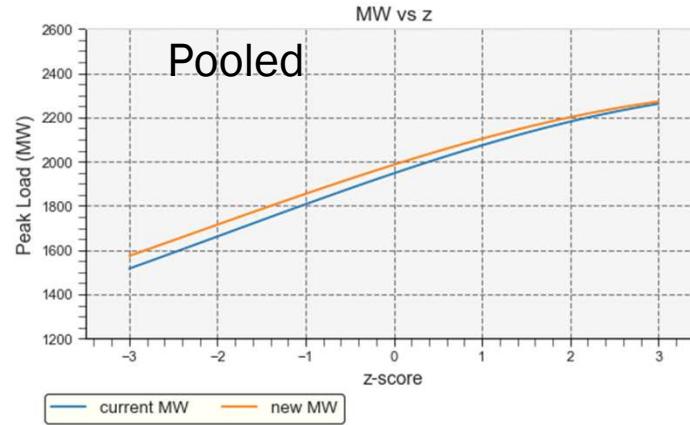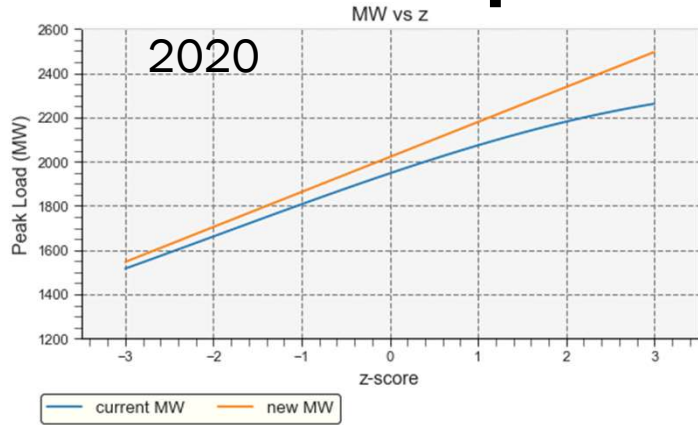
LFU Model Results – Zones H&I

Bin	LFU		
	2020 Model	**Pooled Model**	**Current**
Design	100.0%	100.0%	100.0%
Bin_1	120.20%	111.95%	113.56%
Bin_2	112.57%	108.46%	109.46%
Bin_3	104.95%	103.67%	104.06%
Bin_4	97.33%	97.88%	97.68%
Bin_5	89.71%	91.40%	90.66%
Bin_6	82.09%	84.53%	83.35%
Bin_7	74.47%	77.56%	76.06%

New York ISO

2020 Model – Zone J

	Coef.	Std.Err.	t	P>|t|
Intercept	109668.15	36077.68	3.04	0.0032
wthr	-4247.99	1467.53	-2.89	0.0049
wthr2	55.65	19.82	2.81	0.0063
wthr3	-0.23	0.09	-2.58	0.0118
May	-882.36	78.34	-11.26	0.0000
Jun	-455.20	47.22	-9.64	0.0000
Fri	-178.36	54.09	-3.30	0.0015

Weather Response

Fitted vs Actual
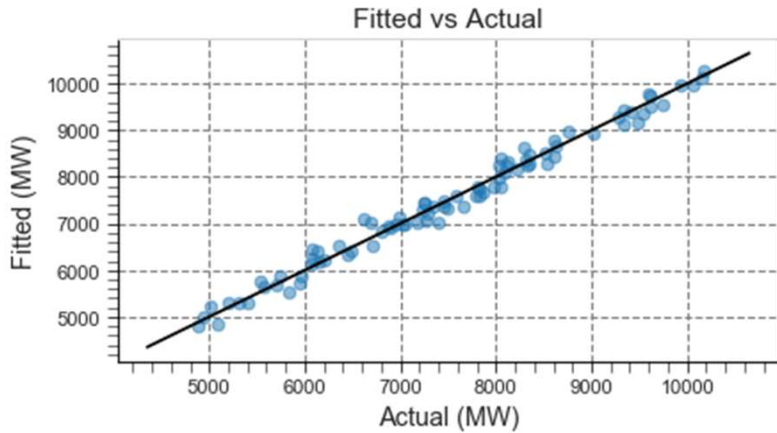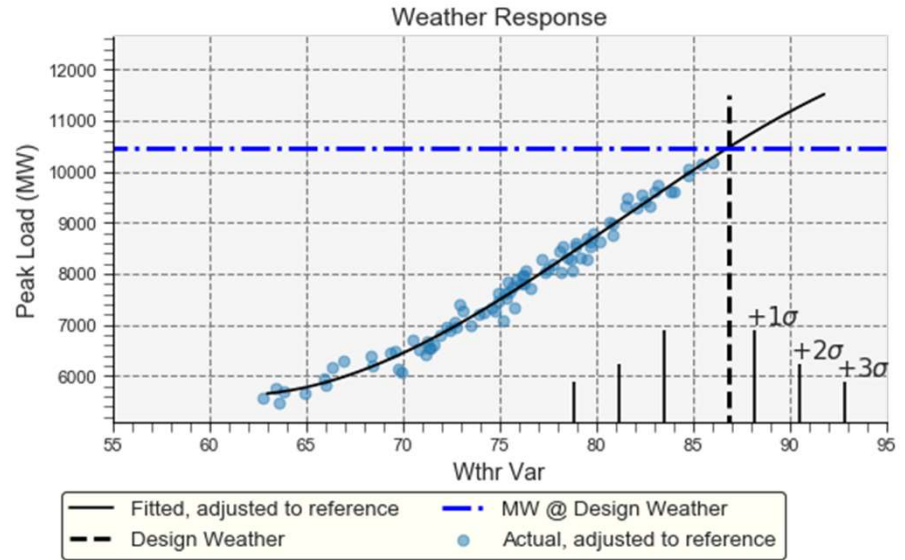
N	86
DF Model	6
R-Sq (%)	98.4
Adj. R-Sq (%)	98.3

New York ISO

Pooled Model – Zone J

	Coef.	Std.Err.	t	P>|t|
Intercept	128486.96	16887.84	7.61	0.0000
wthr	-4996.01	691.11	-7.23	0.0000
wthr2	65.48	9.39	6.97	0.0000
wthr3	-0.27	0.04	-6.41	0.0000
Y2018	743.11	33.22	22.37	0.0000
Y2019	621.07	32.87	18.89	0.0000
May	-231.04	36.24	-6.38	0.0000
Thu	-61.00	26.16	-2.33	0.0205
Fri	-158.79	27.64	-5.75	0.0000
May_2020	-669.35	72.95	-9.18	0.0000
Jun_2020	-484.59	44.83	-10.81	0.0000
Jul_2020	-117.44	49.10	-2.39	0.0175

Fitted vs Actual
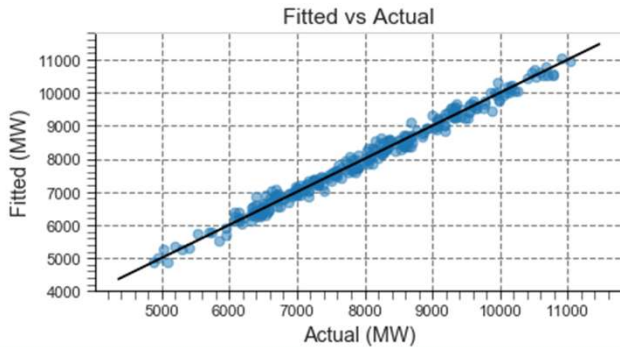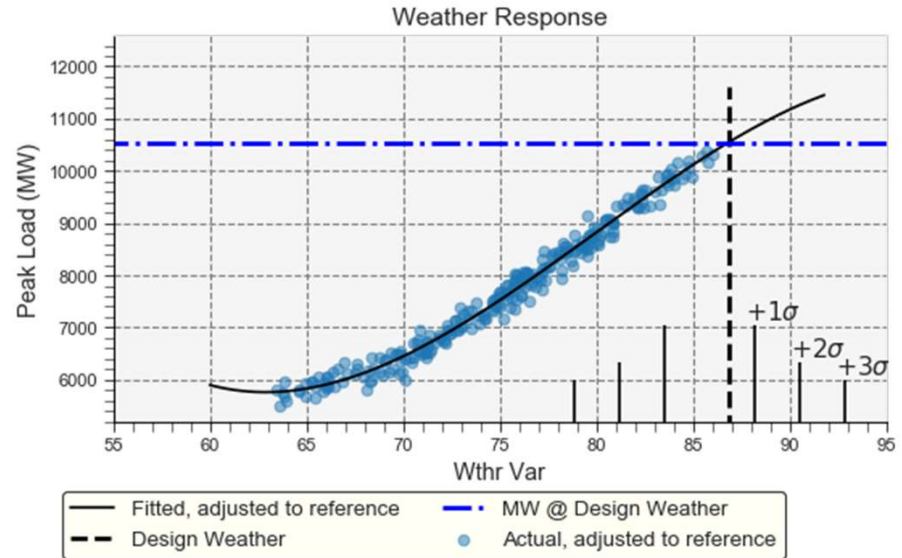
Weather Response

N	268
DF Model	11
R-Sq (%)	98.6
Adj. R-Sq (%)	98.6

New York ISO

Weather Response – Zone J
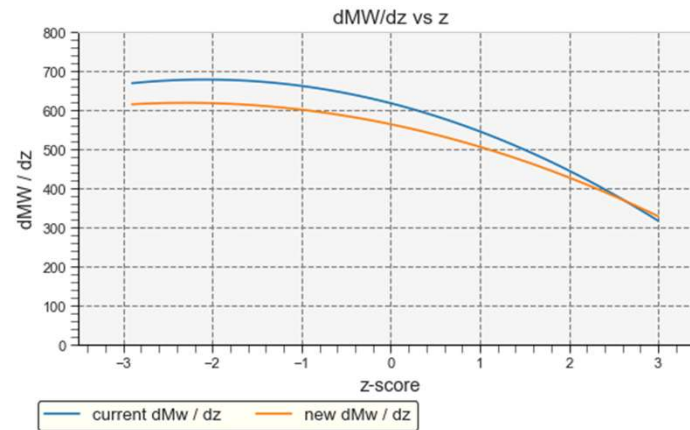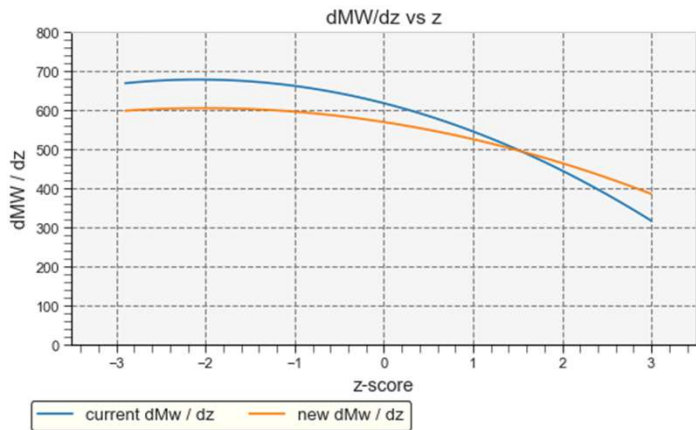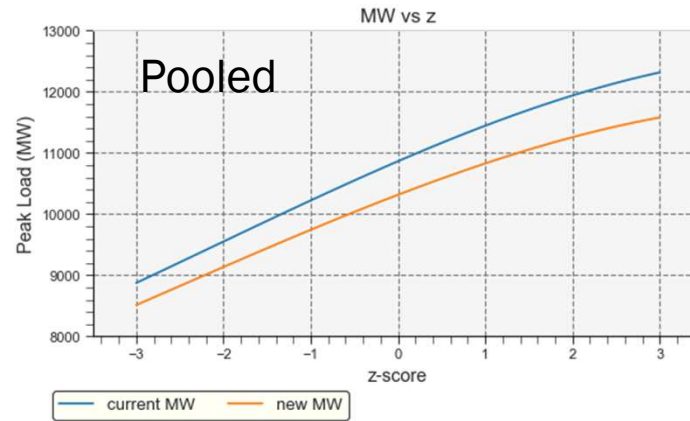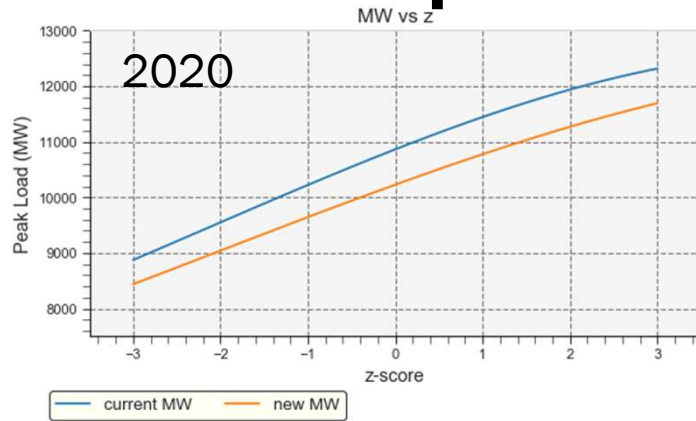
LFU Model Results – Zone J

Bin	LFU		
	2020 Model	**Pooled Model**	**Current**
Design	100.0%	100.0%	100.0%
Bin_1	111.69%	110.79%	110.73%
Bin_2	107.65%	107.23%	107.33%
Bin_3	102.92%	102.82%	102.89%
Bin_4	97.69%	97.75%	97.67%
Bin_5	92.12%	92.22%	91.91%
Bin_6	86.36%	86.43%	85.86%
Bin_7	80.60%	80.57%	79.79%

New York ISO

2020 Model – Zone K

	Coef.	Std.Err.	t	P>|t|
Intercept	123127.98	27024.88	4.56	0.0000
wthr	-4895.78	1099.91	-4.45	0.0000
wthr2	64.64	14.87	4.35	0.0000
wthr3	-0.27	0.07	-4.11	0.0001
May	-288.50	61.37	-4.70	0.0000
Jun	-139.01	39.20	-3.55	0.0006
Fri	-121.14	47.43	-2.55	0.0120
WkEnd	-211.15	36.18	-5.84	0.0000

Weather Response

Fitted vs Actual
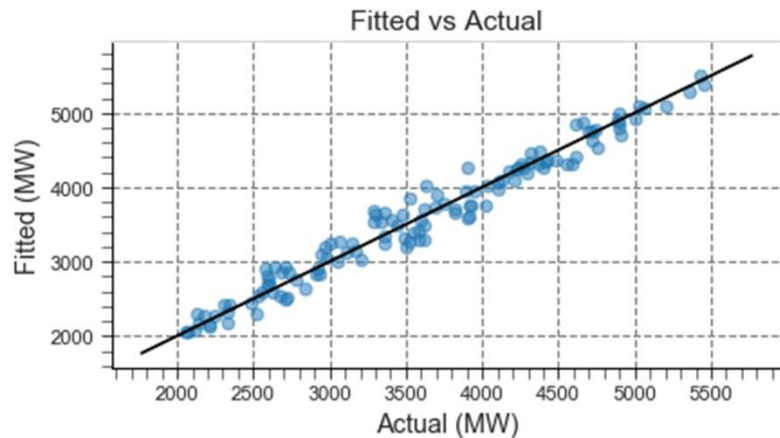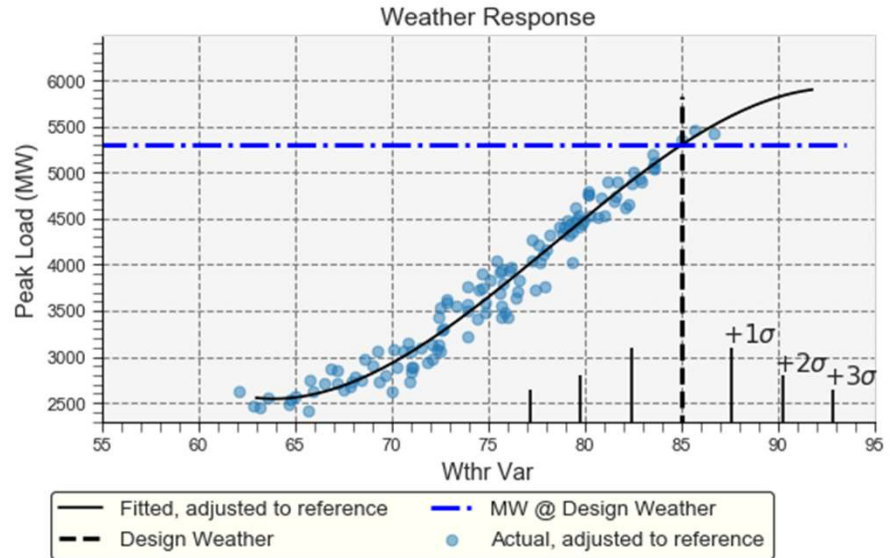
N	121
DF Model	7
R-Sq (%)	96.6
Adj. R-Sq (%)	96.4

New York ISO

Pooled Model – Zone K

	Coef.	Std.Err.	t	P>|t|
Intercept	107605.55	9556.72	11.26	0.0000
wthr	-4295.76	393.88	-10.91	0.0000
wthr2	57.04	5.39	10.59	0.0000
wthr3	-0.24	0.02	-9.94	0.0000
Y2018	49.95	16.44	3.04	0.0025
May	-278.77	27.39	-10.18	0.0000
Sep	-150.21	21.40	-7.02	0.0000
Jun_2020	-200.95	30.88	-6.51	0.0000
WkEnd	-213.20	16.66	-12.79	0.0000

Weather Response

Fitted vs Actual
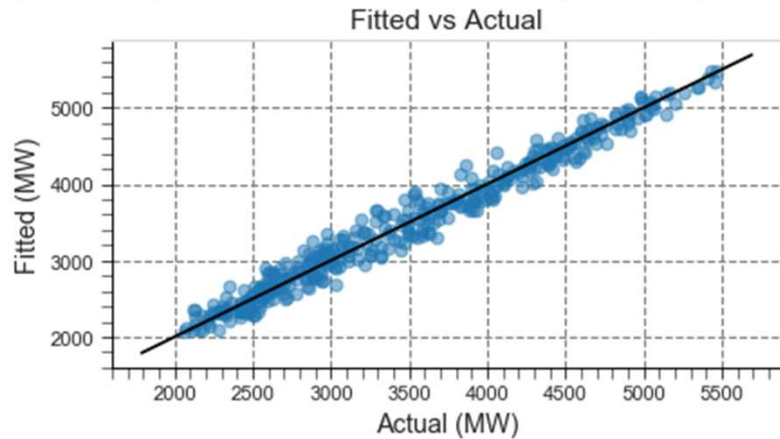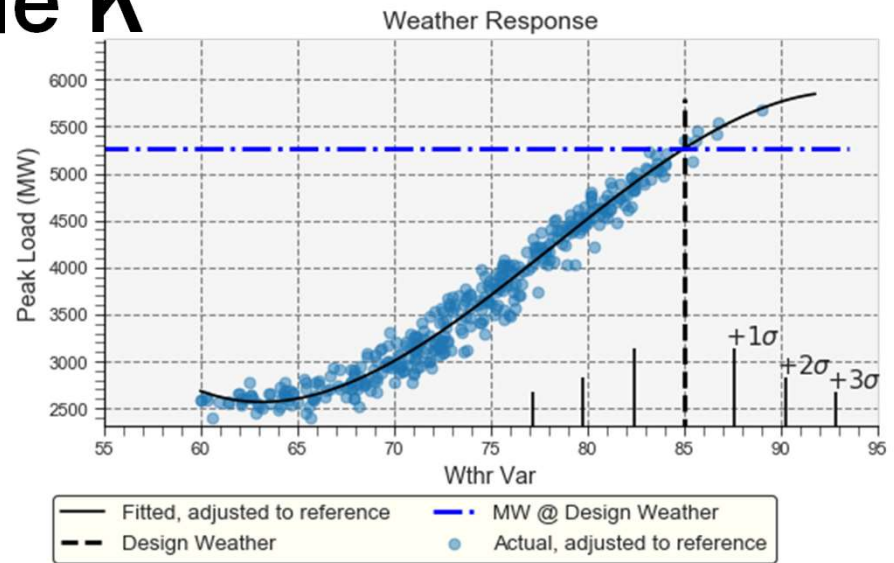
N	380
DF Model	8
R-Sq (%)	97.2
Adj. R-Sq (%)	97.2

New York ISO

Weather Response – Zone K
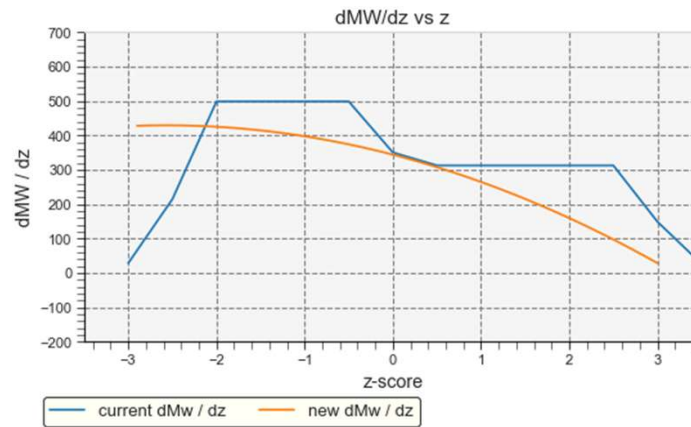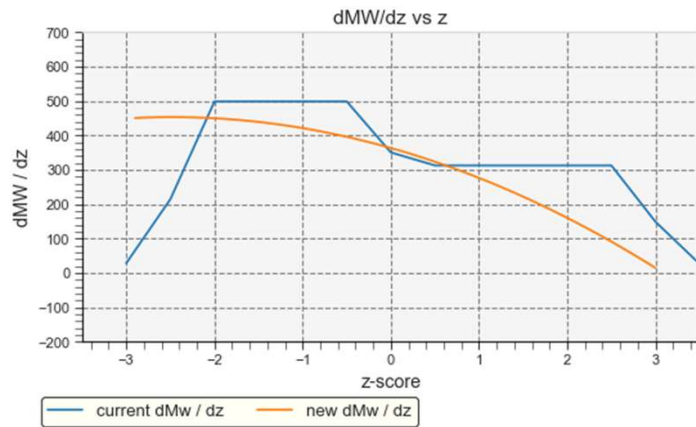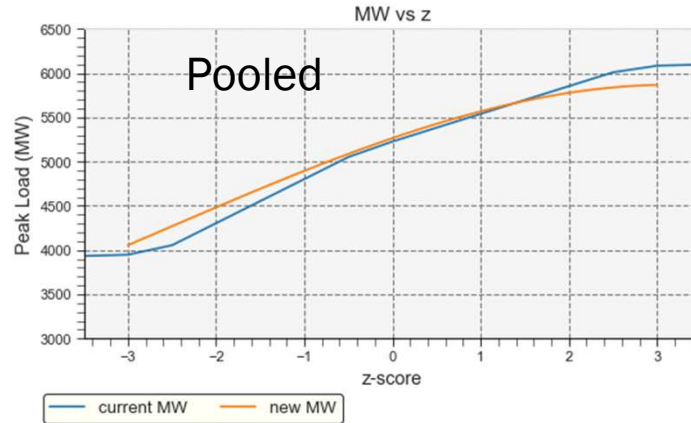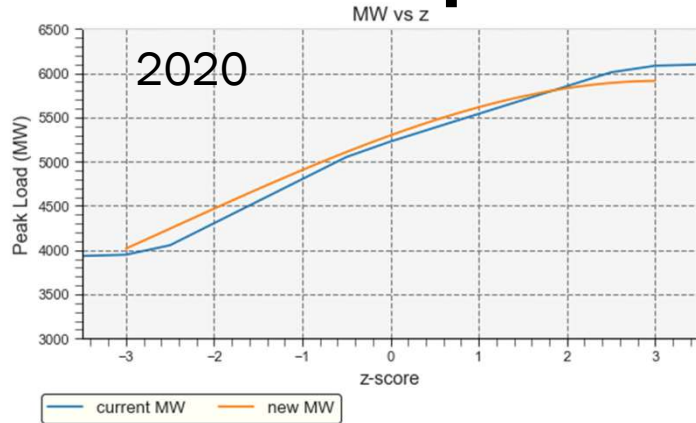
LFU Model Results – Zone K

Bin	LFU		
	2020 Model	Pooled Model	Current
Design	100.0%	100.0%	100.0%
Bin_1	111.62%	111.42%	116.38%
Bin_2	110.06%	109.72%	111.97%
Bin_3	106.00%	105.75%	105.98%
Bin_4	100.00%	100.00%	100.00%
Bin_5	92.60%	92.97%	91.88%
Bin_6	84.36%	85.14%	82.34%
Bin_7	75.83%	77.01%	75.52%

New York ISO